

# **A COMPARISON OF DATA COLLECTION METHODS FOR MEASURING THERMAL COMFORT ON TRAIN JOURNEYS**

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## **ABSTRACT**

Traditionally measurement of subjective thermal comfort has been carried out using paper-based questionnaires (Underwood and Parsons 2005). For this reason, preliminary trials were conducted on trains with paper questionnaires recording subjective thermal comfort. The trials revealed that this method may not be suitable under certain journey conditions (e.g. inclement weather, when standing on a platform or getting on and off the train). For this reason, other methods of data collection were examined.

Personal Digital Assistants (PDAs) have been increasingly used in research when obtaining subjective information (Bernhardt et al. 2007, Dale and LeFlore 2007, Jamison et al. 2001, Raymond and Ross 2000, Trapl et al. 2005) as they can significantly reduce transcription time. In addition, missing data can be eliminated and entries can be time and date stamped enabling detection of entries completed retrospectively. Verbal reports have also been used in research (Ericsson and Simon 1980, Ryan and Haslegrave 2007) as they can provide a rich data source as well as extending the potential experimental population to those with reduced reading and writing skills. Verbal reports are also a way of capturing subjective responses when paper-based or PDA systems are impractical to use.

The experiment aimed to determine whether PDAs and verbal reports are suitable for collecting thermal comfort information on train journeys. The experiment was also designed to establish which method would be most preferred by participants' for use on train journeys.

# **THERMAL COMFORT WHEN BOARDING TRAINS – PRELIMINARY DATA**

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## **ABSTRACT**

Traditional thermal comfort research has predominantly examined comfort in a steady-state environment; however, in reality, people often transition between a number of different environments for relatively short periods of time. A train journey, where passengers spend brief periods in various locations before boarding a train is a real-life example of this.

Research suggests that thermal comfort in a new environment is initially affected by comfort in the preceding location (Jones and Ogawa 1992, Chun et al. 2008). When considering a train journey, it may, therefore, be necessary to understand the thermal state a person is in before boarding a train, to design comfort criteria for the carriage. To examine the effects of prior environments, a laboratory experiment was conducted to examine thermal comfort immediately following a change of environment. 16 participants (8 females, 8 males, mean age=23.52  $\pm$ 2.9 years) were sat in a thermal chamber for 30 minutes on 3 occasions. They were exposed to a different chamber condition on each instance (warm, neutral and cool) and exited into the same thermal conditions (cool). Thermal comfort and skin temperature were recorded throughout the experiment.

Results showed there were no significant differences in thermal comfort between males and females. Although males did show a trend for higher skin temperature, this was not statistically significant. Subjective scores indicate that there is an instant, significant ( $p \leq 0.01$ ) change in sensation after moving to a new environment following three conditions. Scores were compared with Fanger's Predicted Mean Vote (PMV) model of sensation, significant differences ( $p \leq 0.05$ ) in scores were observed indicating that the model is inaccurate with respect to a rapid change in environment.

The results have shown that, following a change of environment, there is no difference in sensation between males and females and prior environments can influence sensation on entering a new environment. When entering an environment that is similar to, or cooler than, the previous one, thermal sensation increases. When moving to a new, cooler environment, sensation showed a sharp decrease but not to the predicted level.